CLAIMS

I claim:

1. A magnetic head comprising:

a free magnetic layer;

a bias layer having a width and being disposed parallel to the free magnetic layer and configured to induce a bias magnetic field in the free magnetic layer; and

a bias pinning layer disposed parallel to the bias layer, having a width that is greater than the bias layer width, and configured to induce a stabilization magnetic field in the bias layer.

2. A magnetic head according to claim 1, wherein the width of the bias pinning layer is at least three times the width of the bias layer.

3. A magnetic head according to claim 1, wherein the bias pinning layer includes cobalt samarium (CoSm) or cobalt platinum chromium (CoPtCr).

4. A magnetic head according to claim 1, wherein the bias pinning layer includes cobalt samarium having between 60 at.% and 95 at.% cobalt and between 40 at.% and 5 at.% samarium.

5. A magnetic head according to claim 1, wherein the bias pinning layer includes

cobalt platinum chromium having between approximately 80 at.% and 68 at.% cobalt, approximately 12 at.% platinum, and between approximately 8 at.% and 20 at.% chromium.

6. A magnetic head according to claim 1, wherein the bias pinning layer has a thickness that is between approximately 10 angstroms (Å) and approximately 50 Å.

7. A magnetic head according to claim 1, wherein:

the bias pinning layer includes a bias pinning material and has a bias pinning thickness; and

the bias pinning material and the bias pinning thickness are selected such that the bias pinning layer has high coercivity and high resistivity.

8. A magnetic head according to claim 1, further including a pinned magnetic layer structure having a width that is substantially greater than a width of the free magnetic layer.

9. A magnetic head according to claim 1, further including:

an anti-ferromagnetic layer having a width that is substantially greater than a width of the free layer; and

a pinned magnetic layer structure having a width that is substantially greater than the width of the free magnetic layer.

10. A magnetic head according to claim 9 wherein the width of the pinned magnetic layer structure is at least three times the width of the free magnetic layer.

11. A magnetic head according to claim 1, further including a pinned magnetic layer structure including a first pinned magnetic layer, an antiparallel coupling layer and a second pinned magnetic layer, wherein said second pinned magnetic layer has a width that is approximately equal to a width of the free magnetic layer and the first pinned magnetic layer has a width that is at least three times the width of the second pinned magnetic layer.

12. A hard disk drive for reading and writing information in a magnetic medium, the disk drive comprising:

a disk having a surface that includes the magnetic medium;

a motor coupled to rotate the disk;

a slider having an air bearing surface;

an actuator configured to hold the air bearing surface of the slider proximate to the surface of the disk;

a magnetic head disposed within the slider and forming part of the air bearing surface, wherein the magnetic head includes:

i) a free magnetic layer;

ii) a bias layer having a width and being disposed parallel to the free magnetic layer and configured to induce a bias magnetic field in the free magnetic

layer; and

iii) a bias pinning layer disposed parallel to the free magnetic layer and the bias layer, having a width that is greater than the bias layer width, and configured to induce a stabilization magnetic field in the bias layer.

13. A hard disk drive according to claim 12, wherein the width of the bias pinning layer is at least three times the width of the bias layer.

14. A hard disk drive according to claim 12, wherein the bias pinning layer includes cobalt samarium (CoSm) or cobalt platinum chromium (CoPtCr).

15. A hard disk drive according to claim 12, wherein the bias pinning layer includes cobalt samarium having between 60 at.% and 95 at.% cobalt and between 40 at.% and 5 at.% samarium.

16. A hard disk drive according to claim 12, wherein the bias pinning layer includes cobalt platinum chromium having between approximately 80 at.% and 68 at.% cobalt, approximately 12 at.% platinum, and between approximately 8 at.% and 20 at.% chromium.

17. A hard disk drive according to claim 12, wherein the bias pinning layer has a thickness that is between approximately 10 angstroms (Å) and approximately 50 Å.

18. A hard disk drive according to claim 12, wherein:

the bias pinning layer includes a bias pinning material and has a bias pinning thickness; and

the bias pinning material and the bias pinning thickness are selected such that the bias pinning layer has high coercivity and high resistivity.

19. A hard disk drive according to claim 12, further including a pinned magnetic layer structure having a width that is substantially greater than a width of the free magnetic layer.

20. A hard disk drive according to claim 12, further including:

an anti-ferromagnetic layer having a width that is substantially greater than a width of the free layer; and

a pinned magnetic layer structure having a width that is substantially greater than the width of the free magnetic layer.

21. A hard disk drive according to claim 20 wherein the width of the pinned magnetic layer structure is at least three times the width of the free magnetic layer.

22. A hard disk drive according to claim 12, further including a pinned magnetic layer structure including a first pinned magnetic layer, an antiparallel coupling layer and a second pinned magnetic layer, wherein said second pinned magnetic layer has a width

that is approximately equal to a width of the free magnetic layer and the first pinned magnetic layer has a width that is at least three times the width of the second pinned magnetic layer.

23. A method for fabricating a magnetic head, comprising:

depositing a plurality of sensor layers, including:

i) a pinned magnetic layer;

ii) a spacer layer;

iii) a free magnetic layer;

iv) a bias spacer layer; and

v) a bias layer;

removing outer portions of a plurality of layers, including the spacer layer, the free magnetic layer, the bias spacer layer, and the bias layer;

depositing an electrical lead layer upon outer portions of the pinned magnetic layer; and

depositing a bias pinning layer upon the bias layer.

23. The method of claim 22, the removing of outer portions of the layers further includes removing outer portions of the bias pinning layer.

24. The method of claim 22, the removing of outer portions of the layers further includes removing outer portions of the pinned magnetic layer.

25. The method of claim 22, wherein:

the pinned magnetic layer includes a first pinned magnetic layer, an anti-parallel coupling layer, and a second pinned magnetic layer;

the removing of outer portions of the layers further includes removing outer portions of the first pinned magnetic layer, the anti-parallel coupling layer, and the second pinned magnetic layer.